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Description

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Rotating Ball Machine, P 15 51 081. 3

It is known that some existing rotary piston machines have a piston shaped as a spherical segment e.g. spherical sector with spherical running surfaces.

This machine has the following advantages:

Since the rotors run perfectly around, a high number of revolutions can be achieved with smoother operation at the same time.

There are less friction losses; the friction of both rotors per rotation is only as high as the throw of the piston and equivalent to the double angle α.

Since the pressure difference is distributed equally to each chamber there are low compression losses.

The distortion of parts as the machine heats up is not a threat, since the temperature rises evenly throughout the machine.

The machine can be cooled by air or cooled by fluids such as oil when designed appropriately.

Furthermore, the chambers have sufficient air ventilation to avoid the formation of toxic carbon monoxide.

FIG. 1-6 show a machine with twelve chambers. The capital letters A, B, C, etc. indicate the parts of the machine, small letters r, s, t etc. indicate conduits, grooves and points and finally the numbers 1 to 12 indicate the chambers 1 to 12.

Fig. 2 shows the top view of Fig. 1 wherein part A of Fig. 1 is shown on the left side for clarification purposes. The rotors in Fig. 1 are hatched to present their dimensions graphically.

Fig. 2 also shows the stator C and the ball bearing E.

Fig. 4 shows the top view of the rotors according to Fig. 3.

The darkened rectangles D represent the relevant seals involved, the light rectangles D represent seals not effective at the moment.

All figures with the exception of Fig. 5 show a cross sectional view of the outer race and is together with rotor A defined as part 1 .

Both rotors intermesh with each other via their characteristic conical gear wheel-like parts and both rotors rotate at the same rotary frequency having their axis at the stator C.
The median lines of said axes and all surface of the parts face the ball center z. The chambers located between the parts change their volume while the rotors are rotating. The two axes of the stator, which are shown in the figure in a 17 degree angle, have conduits and grooves for cooling and lubrication purposes. They further provide the air ventilation for the chambers and the fuel injection for the machine. Fig. 6 is a cross-sectional view of the ball center and of a portion of rotor B. This illustration does not show a sectional view of the peg that limits chamber 12.

The machine featuring a carburetor functions as follows:
When the rotors are rotating, chamber 12 is ventilated by air. A designated fan blows air trough a conduit r of the axis and a groove w from rotor A. At the same time a mix of fuel and air is injected into chamber 1 through a conduit u of the axis and a groove w from rotor A. During the rotation of the rotors the mix will be condensed. This process is shown in chambers 2 to 5. An ignition plug has ignited the mix in the chamber 7. In chambers 7 to 10, the expansion of the ignited mix causes the actuation. Chamber 11 has reached a groove x. With an additional rotation of the rotors air pushes the burned gases through a groove x into a conduit v of the gas-air system F. The conduit q of the gas-air system connects to the suction pipe of the carburetor. Additional streams of combustible mix will be redirected to the carburetor. The chambers have sufficient air ventilation and thus avoid increased build-up of toxic carbon monoxide .

When this machine is built to run with diesel fuel, injection units such as nozzles and pipes will be integrated into the rotors allowing the transport of the fuel without applying pressure.
Conduits s and t serve for cooling and lubrication purposes.

Figures 1 to 6 show a machine with 12 chambers having an α.17 degree angle. The oblique position of the axes allows a compression ratio of 1:7. A smaller angle can be used for machines requiring a higher compression ratio. It is advantageous to use more chambers in this case. A higher amount of chambers reduces the pressure difference and accordingly creates less compression loss in each chamber.

A major advantage of the invention is to obtain comparatively less sliding friction. The sliding friction obtained here is only a fraction of the friction produced by conventional rotary piston machines. Furthermore, the entire sliding friction produced here is used for sealing purposes only. Rollers and ball bearings absorb the actual pressure movements.

With an air cooled type of this machine, the centrifugal force of incoming air will accelerate the cooling with an increasing number of revolutions. In the event that the machine is cooled by a fluid e.g. oil, a pump is not required, since the weight difference of hot and cool liquids accelerate the circulation of fluids with an increasing number of revolutions.

The purpose of the gas-air system shown in Fig. 6 is to detoxify the emissions. In a machine featuring a carburetor, the combustible particles will be redirected to the carburetor through a conduit 8, avoiding unburned fuel residue in the exhaust system. If the machine runs at no-load, only small amounts of fuel gas will reach the chambers, where they will be ignited by ignition plugs installed at appropriate locations, and thus avoid the production of toxic carbon monoxide (in contrast to conventional gasoline engines)

When turning the rotors by 360 degrees, the oblique position, with the help of conduits w, x, and v, results in the following values:

Effective stroke: 140 degree

Gas change 110 degree

Compression 120 degree

Patent claims: **1551081**

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1. A rotating ball machine featuring 2 diagonal axes of the stator (C) with their middle lines meeting at the ball center (z) and 2 rotors (A and B), which work with their characteristic parts intermeshing with each other like conical gear wheels and thus creating chambers which change their volume while the rotors are rotating. Furthermore, it is characterized in that the outer race and the ball core are rotating at the same speed as both rotors (A and B).
2. A rotating ball machine according to claim 1, characterized in that when using carburetor fuel both, the ventilation of chambers with air (system 1) and the injection of a mix of fuel and air (system 2) are provided by two separate sets of conduits.
3. (System 1: r-w-chamber- x resp. y – v,
   System 2 u – illeg. chamber – x resp. y –q)

[Fig. 1-6]